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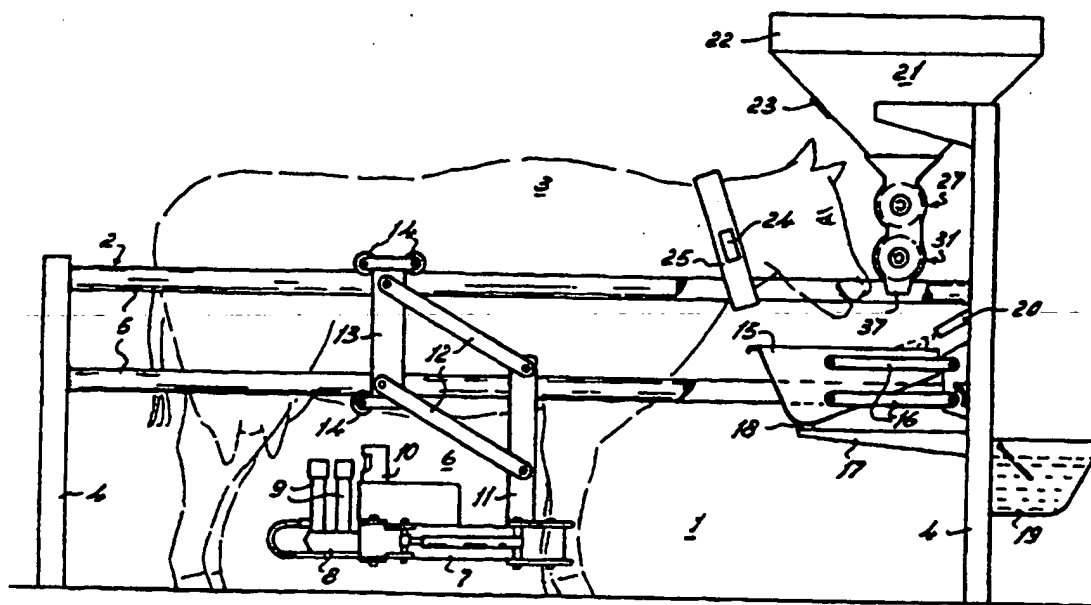
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(54) Title: A CONSTRUCTION INCLUDING AN IMPLEMENT FOR MILKING ANIMALS



(57) Abstract

The invention relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot (6). The implement comprises a feeding trough (15) as well as one or more measuring devices (18) for measuring the weight and/or the quantity of fodder in said feeding trough (15). The implement further comprises a metering device (21) for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period is determined, the arrangement being such that the quantity of fodder to be dispensed to an animal is distributed uniformly or at least substantially uniformly over the feeding period. The feeding period is, preferably, approximately equal to the anticipated milking period of the relevant animal.

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A CONSTRUCTION INCLUDING AN IMPLEMENT FOR MILKING ANIMALS

The invention relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot.

5 Such implements are known.

10 Generally, a construction of the above-defined type is provided with one or a plurality of feeding troughs, in which fodder is automatically supplied to the animals to be milked. Supplying fodder is usually effected by means of a concentrate metering system on the basis of data supplied by an animal identification system, in which an animal reporting at the feeding trough receives a predetermined quantity of fodder.

15 The invention has for its object to provide an implement of the type defined above, it being possible to control the quantity of fodder to be distributed to an animal.

20 According to the invention, this is achieved in that the construction comprises a metering device for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period is determined, the arrangement being such that a quantity of fodder to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period. Using the above measuring device, it is possible to provide that until the end of the milking period a cow can always eat concentrate at leisure, which stimulates the milk production. In addition, it can be ascertained whether the animal's health has deteriorated.

In a preferred embodiment according to the invention, the measuring device comprises piezoelectric elements.

5 In accordance with a further feature of the invention, the implement comprises a feeding trough as well as one or more measuring devices for measuring the weight and/or the quantity of fodder in said feeding trough.

10 The invention still further relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot, characterized in that the construction comprises a metering device for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period is determined, the arrangement being such that a quantity of fodder to be dispensed to the animal is distributed uniformly or at least substantially
15 uniformly over the feeding period. In accordance with a further feature of the invention, the feeding period is approximately equal to the anticipated milking period for a relevant animal. By distributing the supply of concentrate uniformly over the anticipated milking period, the animal's feeling of relaxation during milking is increased. In accordance with a further feature of the invention, it is furthermore possible for the feeding period to be approximately of equal length as the anticipated time required in preparation to milking, such as, e.g., cleaning of the teats, fitting a
20 milking cluster, premilking, etc. In accordance with a still further feature of the invention, the feeding period may also be approximately equal to the anticipated time required for an after-treatment of the teats and/or udder after milking. In a preferred embodiment, however, the feeding period is equal to the time required for the pre-treatment, the milking
25 period and the after-treatment.

30 To ensure that, if the feeding period for a given animal has not yet elapsed whilst the pre-treatment and/or the milking and/or the after-treatment of the animal has/have already been finished, the animal remains in the milking/feeding box, the implement comprises, in accordance with a further feature of the invention, means for enabling an animal to leave a milking/feeding box, such as e.g. a
35 computer-controlled exit door and/or expelling device, which

5 mans are activated at least not until after the feeding period has ended. In accordance with a still further feature of the invention, if it has been established by the computer that the pre-treatment and/or the milking and/or the after-treatment has/have been finished whilst the feeding period of the relevant animal has not yet elapsed, the feeding period is adapted so as to provide that the animal receives the remaining quantity of fodder more rapidly.

10 In accordance with a further feature of the invention, the feeding period is automatically adjusted, after it has been found that prior to and/or during and/or after milking unwanted time delays have occurred, e.g. because an animal has kicked off a teat cup which has to be refitted, to ensure that the supply of fodder is as yet uniformly distributed over the remaining anticipated feeding period. By
15 adjusting the feeding period, it is prevented that the entire portion of fodder to be dispensed is finished prematurely, whilst actually the animal should still be kept quiet by a remaining portion of fodder still to be supplied to it, so
20 that the milking period can be finished in a relaxed way. In accordance with a feature of the invention, the metering device comprises means, with the aid of which always relatively small portions of fodder can be dispensed into the feeding trough. Thus, it is achieved that during the feeding
25 period the animal is at her leisure and can take a bite of concentrate.

30 In an embodiment according to the invention, the means, with the aid of which a relatively small portion of fodder can always be dispensed into the feeding trough, comprise a motor with a controllable number of revolutions and motor-driven blades. To stimulate the fodder consumption, the implement comprises, in accordance with a still further feature of the invention, a grinding device, by means of which the fodder to be dispensed can be ground. The invention, therefore, further relates to a construction including
35 an implement for milking animals, such as cows, characterized in that the feeding implement comprises a grinding device, by means of which the fodder to be supplied can be ground. In accordance with a further feature of the invention, the

grinding device is disposed near the metering device. In accordance with a still further feature of the invention, the grinding device comprises a plurality of fixed, spaced-apart grinding members.

5 In accordance with a further feature of the invention, the feeding trough is attached to the feeding box by means of a pivotal parallelogram construction. Furthermore, in accordance with a feature of the invention, the milking robot, by means of which the teat cups can automatically be
10 connected to the teats of an animal to be milked, is arranged in or near the feeding box. In accordance with a still further feature of the invention, the implement comprises a cow identification system, with the aid of which the identity of the individual animals can be determined. In accordance
15 with a further feature of the invention, a computer programme determines the quantity of fodder to be dispensed to the animal by the metering device per feeding period and/or per 24 hours' period. In addition, it is possible, in accordance
20 with the invention, to determine for each animal, using the measuring device, how much fodder the animal has consumed throughout the predetermined feeding period. In accordance with a further feature of the invention, it is determined after each feeding period, using the measuring device, how much fodder has been left behind in the feeding trough,
25 whilst in the computer this quantity is deducted from the quantity of fodder to be supplied to a subsequent, other animal reporting at the feeding trough. Thus, it is prevented that a subsequent animal gets the fodder left behind in the feed trough in addition to its predetermined quantity of
30 fodder. In accordance with a still further feature of the invention, the quantity of fodder left behind in the feeding trough is added to the quantity of fodder the relevant animal receives in one or more subsequent feeding periods. This achieves that during a plurality of feeding periods per 24
35 hours' period the predetermined quantity of fodder for that 24 hours' period is supplied to the relevant animal.

 In accordance with a further feature of the invention, it is possible to set in the computer a threshold value which represents the difference between the quantity and/or

the weight of the fodder supplied during a feeding period and the fodder consumed by the animal, whilst, when this threshold value is exceeded, the computer gives a signal. The signal warns an operator that something may be wrong with the animal's health, which is advantageous in particular when a milking robot is used. In accordance with a characterizing feature of the invention, the attention signal is a light signal and/or a sound signal and/or a visible indication on a display screen and/or a print-out of an attention list of the computer. In accordance with a still further characterizing feature of the invention, exceeding of the threshold value is used to check the health of an animal, whilst, after the computer has found that the threshold value has been exceeded by a predetermined percentage, the animal is automatically isolated in a separate section. In the separate section, the animal can be checked in greater detail by a supervisor or a veterinary surgeon. In accordance with a characterizing feature of the invention, isolating the animal is accomplished by means of a computer-controlled gate disposed close to the feeding/milking box.

In order to increase the rate at which the fodder is eaten, the feeding implement comprises, in accordance with the invention, means for adding a liquid, such as water, to the fodder. The invention, therefore, further relates to a construction including an implement for milking animals, such as cows, characterized in that the feeding implement comprises means for adding a liquid, such as water, to the fodder. The means for adding the liquid comprise, in accordance with the invention, a computer-controlled valve and a spraying device. Using the spraying device, it is possible to moisten fodder, such as cubes of concentrate.

In accordance with a further feature of the invention, the spraying device may have been disposed near the feeding trough.

In accordance with a still further feature of the invention, the milking box comprises a drinking bowl, in which, depending on the animal, a quantity of liquid, such as water and/or milk, is supplied. The invention, therefore, further relates to a construction including an implement for

milking animals, such as cows, equipped with a milking robot, characterized in that the implement comprises a drinking bowl, in which, depending on the animal, a quantity of liquid, such as water and/or milk, can be supplied. In accordance with a still further characterizing feature of the invention, the liquid is dispensed during the anticipated milking period and/or pre-treatment period and/or aft r-treatment period.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a side view of an implement for milking animals, including a milking robot, and a concentrat metering system including a feeding trough with a measuring device for measuring the quantity of fodder in the feeding trough;

Figure 2 is a cut-away and enlarged detail of the concentrate metering system of Figure 1, and

Figure 3 is a view of the concentrate met ring system taken on the line III-III in Figure 2.

Figure 1 is a side view of a milking/feeding box 1 which includes a railing 2 disposed near the circumference of an animal 3 during its stay in the milking/feeding box 1. The railing 2 includes two uprights 4, between which there are two cross-beams 5 which are arranged remotely from and parallel to one another. At one side of the milking/feeding box, a milking robot 6 is attached to the cross-beams 5. The milking robot 6 comprises a robot arm 7 having at its end teat cups 9 supported by a carrier 8. The robot arm 7 further accomodates near the teat cups 9 a sensor 10, with the aid of which the position of the teats of an animal can be determined. The sensor may be constituted by a laser sensor. By means of (non-shown) cylinders, the robot arm 7 can be moved in the vertical direction as well as in a horizontal plane. The cylinders may be constituted by pneumatic or hydraulic cylinders, or the robot arm may be moved by means of electric motors. Furthermore, on the robot arm 7 there is disposed a vertical support 11 which is connect d to a parallelogram

construction 12. The other end of the parallel ogram structure 12 is connected to a likewise vertically extending supporting beam 13, which is provided at both ends with a pair of roller elements 14. The vertically extending supporting beam 13 is arranged by means of the roller elements 14 between the cross-beams 5 of the railing 2. Using a (non-shown) electric motor, the robot arm 7 can be moved in the lengthwise direction of the cross-beam 5.

Near the leading side of the milking/feeding box 1, a feeding trough 15 is attached to the upright 4. The feeding trough 15 is connected to the upright 4 by means of a parallelogram construction 16. At its bottom side, the feeding trough 15 is supported by a supporting beam 17. In addition, arranged between the supporting beam 17 and the bottom side of the feeding trough 15 there is a measuring device 18, with the aid of which the weight of the feeding trough 15 and its contents can be determined. In the present embodiment, the measuring device 18 comprises a piezoelectric element. Furthermore, at the exterior side of the milking/feeding box 1, a drinking bowl 19 is attached to the upright 4. Near the upper side of the feeding trough, a computer-controlled spraying device 20 is further attached to the upright 4, with the aid of which the fodder present in the feeding trough 15 can be moistened with a liquid, such as water. A metering device 21 for dispensing fodder into the feeding trough 15, such as concentrate, is attached over the feeding trough 15 to the upright 4. The metering device 21 includes a hopper 22 for the fodder. Against the outer wall of the hopper 22 there is attached a receiver 23 which is part of a (non-shown) cow identification system. The receiver 23 can receive signals from a transmitter 24, which by means of a collar 25 is placed around the neck of an animal.

Figures 2 and 3 illustrate in greater detail a concentrate metering device 21. At its bottom side, the hopper 22 has an aperture 26 to which a metering mechanism 27 is contiguous. The metering mechanism 27 comprises a blade wheel 29 accommodated in a cylindrical housing 28 and a computer-controlled metering slide 30 accommodated in the wall of the cylindrical housing 28. In addition, provided near the

bottom side of the metering slide 30 there is a grinding device 31, with the aid of which the fodder measured out by the metering mechanism 27 can be ground. The ground fodder leaves the grinding device 31 via an aperture 37 and drops
5 into the feeding trough 15. The grinding device 31 includes a second cylindrical housing 32 which accomodates a drivable shaft 33, on which spaced-apart knives 34 are fitted. Knives 35, which are likewise spaced apart from each other and are in a fixed position, are attached to the interior wall of the
10 second cylindrical housing 32. During grinding of the fodder, the motor-driven knives 34 pass between the knives 35 secured on the second cylindrical housing, as a result of which the fodder is ground. Both the fixed knives 35 and the drivable knives 34 are of a curved and moon-shaped design. Arranged at
15 the exterior side of the two cylindrical housings 28 and 32 there are arranged electric motors 36, whose number of revolutions can be made variable under the control of a computer. The electric motors 36 drive the blade wheel 29 and the rotatable knives 34, respectively.

20 The above-described construction including an implement for milking animals operates as follows:

After an animal 3 has entered via a (non-shown) entrance door, the milking/feeding box 1 and the transmitter 24 has come within the receiving range of the receiver 23,
25 the animal 3 is automatically identified by the cow identification system. In addition, for each animal it can be stored in the computer how much fodder the relevant animal receives per feeding period. The quantity of fodder to be supplied can be made to depend, in the computer, on the stage
30 of the lactation period the animal is in. In the computer there is defined for each animal the relationship between the productivity of the animal and the related fodder consumption. Thereafter, using the computer, it is computed how much fodder the concentrate metering system 21 is to deposit
35 per unit of time in the feeding trough 15 during the milking period, so as to provide that the quantity of fodder to be dispensed is distributed uniformly or at least substantially uniformly over the feeding period. The fodder doses deposited in the feed through 15 are measured such that the animal 3

can always eat some fodder during the feeding period in the milking/feeding box. Since the animal 3 remains quiet during eating, it is possible for the sensor 10 to determine with great precision the position of the teats of the animal to be milked, and the teat cups 9 can be connected relatively quickly to the teats of the animal.

Using the measuring device 18, it is further determined how much fodder the relevant animal has consumed during the feeding period. If after the feeding period it is found that the animal has left fodder behind in the feeding trough, this quantity is stored in the computer in the file of the relevant animal as still owing to it and this quantity can optionally be added in one or more subsequent feeding periods. If thereafter another animal reports at the milking/feeding box 1, then in the computer the quantity of fodder left behind in the feeding trough 15 is deducted from the quantity of fodder to be supplied to the relevant animal. In a further (non-shown) embodiment, the feeding trough may include means, with the aid of which the feeding trough 15 can automatically be emptied before a further animal enters the milking/feeding box 1. Stored in the (non-shown) computer there is also a threshold value, which can be set by an operator and which represents the difference between the quantity and/or the weight of the fodder dispensed to and consumed by the animal during the feeding period. When this threshold value is exceeded, the computer outputs a signal. An operator can then be notified by means of a (non-shown) attention list print-out of the computer that one or more animals show deviations in the fodder consumption. In addition, a second threshold value may have been stored in the computer, which value implies that the said first threshold value has been exceeded by a predetermined percentage. If the second threshold value is exceeded, the relevant animal is automatically isolated by means of a (non-shown) computer-controlled gate in a (non-shown) separate section.

To stimulate the consumption rate of the fodder, e.g. with highly productive animals, which must take in much fodder in a relatively short period of time, the electric motor 36 of the grinding device 31 is energized with the aid

of the computer, so that fodder delivered by the blade wheel 29 to the grinding device 31 is ground. The fodder, ground or not ground, can optionally be moistened by means of the computer-controlled spraying device 20 so as to increase in this manner the rate of consumption still further. As the number of revolutions of the electric motor 36 driving the blade wheel 29 is variable, it is possible to effect a very accurate, optionally continuous metering of the fodder in the feeding trough 15.

10 In addition, a computer-controlled drinking bowl, such as the drinking bowl 19, may be placed in or at the milking/feeding box 1, with the aid of which liquid, such as water and/or milk, can be supplied depending on the animal (Figure 1). Furthermore, the liquid and/or (concentrated) 15 fodder can preferably be supplied during the anticipated milking period and/or pre-treatment period and/or after-treatment period. Thus, it is possible to adapt the feeding and/or drinking period when it is found that the teat cups 9 cannot be fitted on the teats of an animal in the anticipated 20 period of time, or when the animal kicks off one or more teat cups and the milking cluster is to be connected again.

The invention is not limited to the features described in the foregoing, but also relates to all the features shown in the drawings.

CLAIMS

1. A construction including an implement for milking animals, such as cows, equipped with a milking robot (6), characterized in that the construction comprises a metering device (21) for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period can be determined, the arrangement being such that a quantity of fodder still to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period.

2. A construction including an implement for milking animals, such as cows, equipped with a milking robot (6), characterized in that the implement comprises a feeding trough (15) as well as one or more measuring devices (18) for measuring the weight and/or the quantity of fodder in said feeding trough (15).

3. A construction as claimed in claim 2, characterized in that the measuring device (18) comprises piezoelectric elements.

4. A construction as claimed in claim 2 or 3, characterized in that the construction comprises a metering device (21) for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period can be determined, the arrangement being such that a quantity of fodder to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period.

5. A construction as claimed in claim 1 or 4, characterized in that, on the basis of the feeding period, the computer applies a signal to the metering device (21), with the aid of which the metering device (21) is automatically adjusted.

6. A construction as claimed in any one of claims 1, 4 or 5, characterized in that the feeding period is approximately equal to the anticipated milking period of a relevant animal.

7. A construction as claimed in any one of the preceding claims, characterized in that the feeding period can be adapted to the anticipated, required time for preparing the milking operation, such as e.g. cleaning of the

teats, connecting the teat cups to the teats, premilking, etc.

5 8. A construction as claimed in any one of the preceding claims, characterized in that the feeding period can be adapted to the anticipated, required time for after-treatment of the teats and/or the udder after milking.

10 9. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises means for enabling an animal to leave a milking/feeding box, such as e.g. a computer-controlled exit door and/or expelling device, which means are activated at least not until after the feeding period has ended.

15 10. A construction as claimed in claim 9, characterized in that, if it has been established by the computer that the pre-treatment and/or the milking and/or the after-treatment has/have been finished whilst the feeding period of the relevant animal has not yet elapsed, the feeding period is adapted so as to provide that the animal receives the remaining quantity of fodder more rapidly.

20 11. A construction as claimed in any one of the preceding claims, characterized in that the feeding period is automatically adjusted, after it has been found that prior to and/or during and/or after milking unwanted time delays have occurred, e.g. because an animal has kicked off a teat cup
25 which has to be refitted, so that the fodder is as yet uniformly distributed over the remaining anticipated feeding period.

30 12. A construction as claimed in any one of the preceding claims, characterized in that the metering device (21) comprises means (27), with the aid of which always relatively small portions of fodder are dispensed in the feeding trough (15).

35 13. A construction as claimed in claim 12, characterized in that the means comprise a motor (36) having a controllable number of revolutions and blades (29) driven by said motor (36).

14. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises a grinding device (31), by means of which the

fodder to be dispensed can be ground.

15. A construction as claimed in claim 14, characterized in that the grinding device (31) is disposed near the metering device (21).

5 16. A construction as claimed in claim 14 or 15, characterized in that the grinding device (31) comprises a plurality of fixed, spaced-apart grinding members (34, 35).

10 17. A construction as claimed in any one of the preceding claims, characterized in that the feeding trough (15) is attached to a feeding box (1) by means of a pivotal parallelogram construction (16).

18. A construction as claimed in any one of the preceding claims, characterized in that a milking robot (6) is arranged in or near the feeding box (1).

15 19. A construction as claimed in any one of the preceding claims, characterized in that the implement comprises a cow identification system.

20 20. A construction as claimed in any one of the preceding claims, characterized in that in a computer it is determined for each animal individually how much fodder is to be dispensed by the metering device (21) per feeding period and/or per 24 hours' period.

25 21. A construction as claimed in any one of the preceding claims, characterized in that, using the measuring device (18), it is measured how much fodder the relevant animal has consumed over a predetermined feeding period.

30 22. A construction as claimed in claim 21, characterized in that it is determined after each feeding period, using the measuring device (18), how much fodder has been left behind in the feeding trough (15), and that the computer deducts this quantity from the quantity of fodder to be supplied to a subsequent, other animal reporting at the feeding trough (15).

35 23. A construction as claimed in claim 22, characterized in that the quantity of fodder left behind in the feeding trough (15) is added to the quantity of fodder the relevant animal receives in one or more subsequent feeding periods.

24. A construction as claimed in any one of claims 21

to 23, characterized in that it is possible to set in the computer a threshold value which represents the difference between the quantity and/or the weight of the fodder supplied during a feeding period and the fodder consumed by the animal, whilst, when this threshold value is exceeded, the computer gives a signal.

25. A construction as claimed in claim 24, characterized in that the signal is in the form of a light signal and/or a sound signal and/or a message on a display screen and/or an attention list print-out of the computer.

26. A construction as claimed in any one of claims 21 to 25, characterized in that exceeding of the threshold value is used to check the health of an animal, and that, after the computer has found that the threshold value has been exceeded by a predetermined percentage, the animal is automatically isolated in a separate section.

27. A construction as claimed in claim 26, characterized in that separating an animal is effected by means of a computer-controlled gate arranged near the feeding/milking box (1).

28. A construction as claimed in any one of the preceding claims, characterized in that the feeding device comprises means for adding a liquid to the fodder.

29. A construction as claimed in claim 28, characterized in that the means for adding the liquid comprise a computer-controlled valve and/or a spraying device (20).

30. A construction as claimed in claim 29, characterized in that the spraying device (20) is arranged near the feeding trough (15).

31. A construction as claimed in any one of the preceding claims, characterized in that the milking box (1) comprises a drinking bowl (19), in which, depending on an animal, a quantity of liquid, such as water and/or milk, can be supplied.

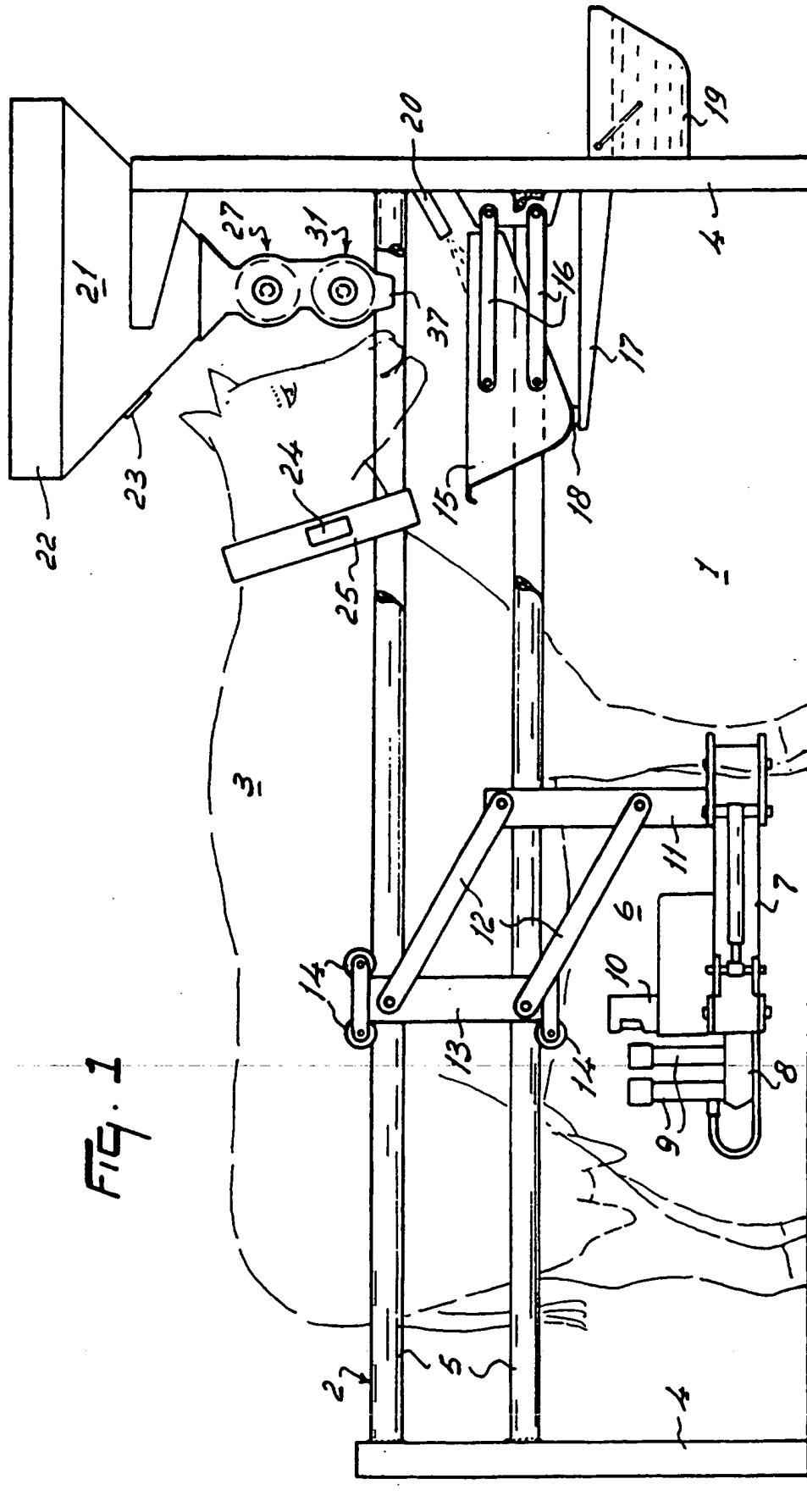
32. A construction as claimed in claim 31, characterized in that the liquid is supplied together with concentrate.

33. A construction as claimed in any one of the preceding claims, characterized in that the duration of the

feeding period is controllable.

5 34. A construction as claimed in any one of claims 31 to 33, characterized in that the liquid is supplied during the anticipated milking period and/or pre-treatment period and/or after-treatment period.

35. A construction as claimed in one or more of the preceding claims, and/or as described and illustrated in the accompanying description and drawings.



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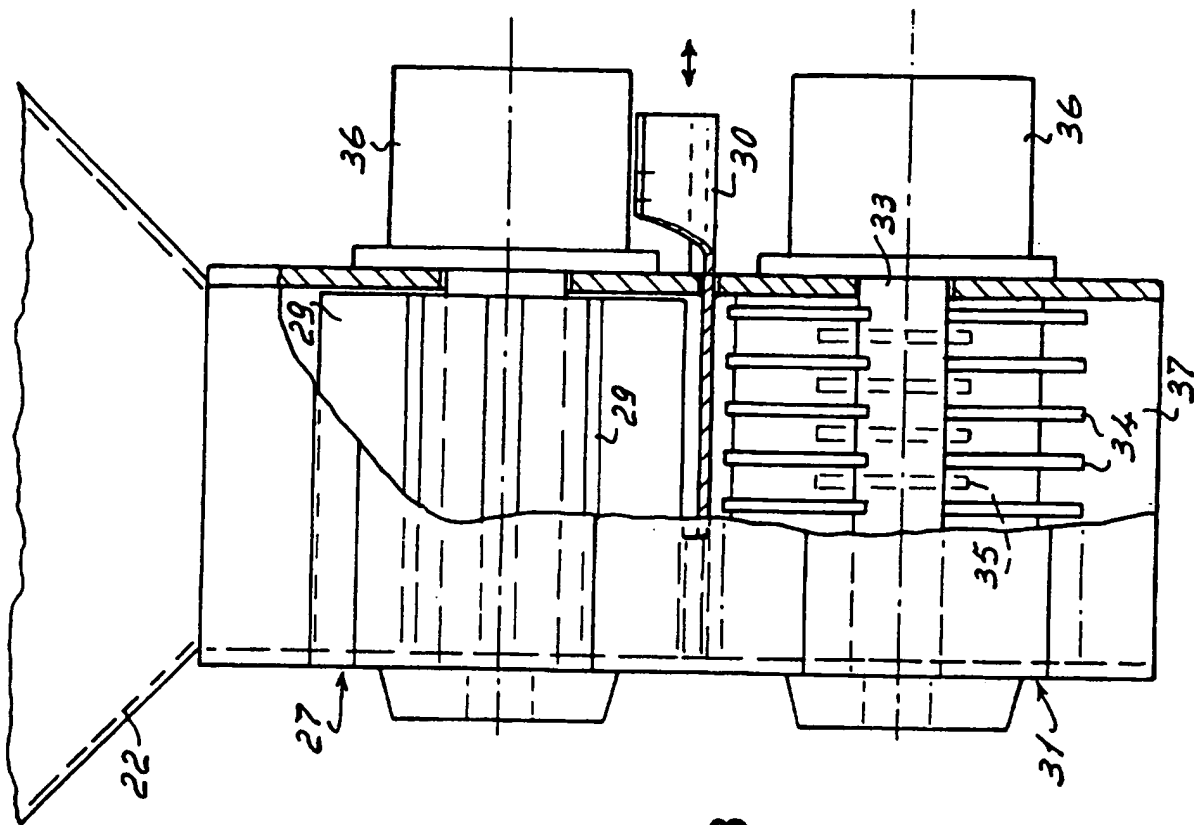


FIG. 3

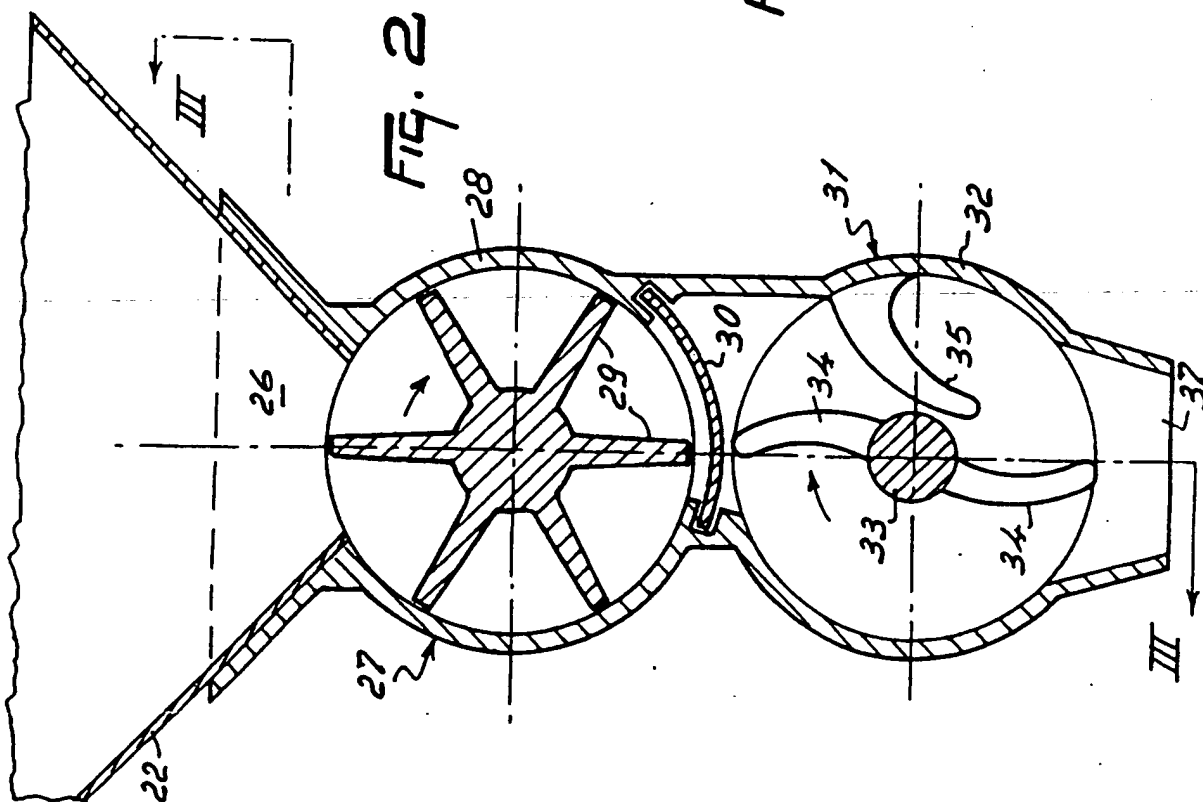


FIG. 2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 95/00278

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A01J5/017 A01K5/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A01J A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No. .
Y	GB,A,1 031 245 (CLAY EQUIPMENT CORPORATION) 2 June 1966	1,35
A	see page 1, line 14 - line 55 see page 3, line 40 - line 120 see claims 1,2; figures	12,13
Y	EP,A,0 091 892 (ALFA-LAVAL) 19 October 1983	1,35
A	see page 2, line 21 - line 31 see page 5, line 24 - line 28 see claims 1,5; figure 1	18
P,A	EP,A,0 630 560 (VAN DER LELY) 28 December 1994 see column 2, line 1 - line 38; figure 1	1,18,35
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *&* document member of the same patent family

Date of the actual completion of the international search

7 November 1995

Date of mailing of the international search report

29. 11. 95

Name and mailing address of the ISA

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Authorized officer

Piri u, J-C

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/NL 95/00278

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 332 229 (VAN DER LELY) 13 September 1989	2,19,35
A	see column 3, line 1 - line 27	17
A	see column 3, line 28 - line 38	1
	see column 4, line 6 - line 16	
	see claims 1,5,6; figures	

Y	GB,A,2 190 574 (BRISBY) 25 November 1987	2,19,35
A	see page 1, line 66 - line 78	20-23
	see page 3, line 90 - page 4, line 15	
	see claims 1,2,10; figures	

A	NL,A,9 200 095 (VAN DER LELY) 16 August 1993	2,19,35
A	see page 3, line 7 - page 4, line 8	1
A	& DATABASE WPI	1,2,19,
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	Derwent Publications Ltd., London, GB;	
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	see abstract	

A	US,A,4 735 171 (ESSEX) 5 April 1988	2,35
	see column 1, line 17 - line 24	
	Abstract	
	see claims 1-4; figures	

A	FR,A,2 507 435 (LA TELEMECANIQUE ELECTRIQUE) 17 December 1982	2,20-23, 35
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A	FR,A,2 623 688 (PATUREL) 2 June 1989	2,19-21, 35
	see page 1, paragraph 4 - page 2, paragraph 1	
	see page 3, paragraph 2 - paragraph 3	
	see claims; figures	

A	EP,A,0 395 179 (PROLION DEVELOPMENT) 31 October 1990	2,12, 16-19,35
	see column 2, line 35 - column 3, line 34	
	see claims; figures	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NL95/00278

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims: 1 and 5-35 as far as related to 1
2. Claims: 2 and 3 to 35 as far as related to 2

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 95/00278

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International Application No.

PCT/NL 95/00278

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